

THE ROLE OF ACCULTURATION IN THE HEALTH BELIEF MODEL
FOR MEXICAN-AMERICANS WITH TYPE II DIABETES

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Diabetes has alarming prevalence rates not only in the U.S., but also worldwide. Ethnicity plays a large role with Hispanic-Americans having one of the highest prevalence rates. Diabetes is a complicated disease that requires significant lifestyle modifications. The health belief model (HBM) has been investigated as a theory to explain behavior change. However, little research has been done to determine its utility to Mexican-Americans. In the current study, participants were Mexican-American adults ($N = 66$) with type II diabetes who were recruited from family medicine clinics. Self-report questionnaires included the General Acculturation Index (GAI) and the Multidimensional Diabetes Questionnaire (MDQ). Participants had the option to complete them in either Spanish or English. Laboratory values were collected from medical charts. A MANCOVA indicated that two variables were significant, perceived severity (PS) and misguided support behaviors (MSB), $p < .05$. With respect to the HBM, PS was identified as a component of an individual's perception, acculturation was a modifying factor, and MSB was a component of the likelihood to change factors. These three affected glycemic control. Odds ratios determined that individuals with better glycemic control had less perceived severity and less misguided supportive behavior. Individuals with the least acculturation were more likely to have best glycemic control. Significant results were found for each of the three main columns of the model suggesting that the HBM has utility for the Hispanic-American population

with type II diabetes. Results suggest that health care personnel should be aware of the ramifications of patients' perceived severity of their illness as well as the amount the "nagging" type support they receive from friends and family on glycemic control. This awareness can lead to the development of interventions aimed at improving glycemic control and the quality of life in Mexican-Americans with diabetes. Specifically, programs focused on incorporating the family may lead to improved psychosocial and educational outcomes since familial relationships are crucial in this population.

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CHAPTER I

INTRODUCTION

The prevalence of diabetes in the United States has grown to an alarming 20.8 million people or 7.0% of the population. Individuals aged 60 years and older accounted for 20.9% of all people with diabetes with the prevalence rate higher in men (10.5%) compared to women (8.8%). Although it is often underreported on death certificates, diabetes was the 6th leading cause of death in 2002 (Center for Disease Control, 2005). Moreover, the number of new cases increased by 52% in the years 1997 to 2003. In 2002, the combined direct and indirect costs related to diabetes were \$132 billion. Approximately 1.1 million people died from diabetes worldwide (WHO, 2006). Further, the World Health Organization (WHO) projects that by 2030 over 30 million people in the United States will have diabetes (WHO, 2006).

The Physiology of Type II Diabetes

The physiology of diabetes mellitus is fairly well known. People with type II diabetes usually present with a triad of pathophysiological abnormalities, which includes increased hepatic glucose output, impaired pancreatic insulin secretion, and insulin resistance. There is a large genetic basis with contributing environmental determinants (Edelman & Kim, 2002). Genetic studies of type II diabetes have suggested that the concordance rates were about 50% in identical twins. Environmental factors such as diet and lifestyle, interact with genes and biology (Charles, 2002).

Prior to the development of diabetes, insulin secretion is higher than normal during periods of fasting and in response to oral glucose tolerance tests (OGTT). During

the early stage, blood glucose levels are mildly elevated. As the disease progresses, glucose levels continue to rise as does hyperinsulinemia. As this point insulin levels are more than five times normal, however the body cannot manage the high glucose levels. Two-hour post-prandial glucose levels may reach above 400 mg/dL, while fasting levels exceed 200 mg/dL. This is compared to a normal fasting glucose of <90 mg/dL and a post-prandial of <140 mg/dL. Insulin secretions then drop dramatically. The hyperinsulinemia observed before and early in the disease process is the insulin resistance, which is key in type II diabetes. This results in diminished insulin activity in the liver as well as in the fat and muscle tissue. This results in disposal of glucose in the periphery and more glucose produced by the liver, which leads to hyperglycemia (Charles, 2002).

An individual is diagnosed with impaired glucose tolerance (IGT) when the 2 hour post-prandial (after an OGTT) is 140-200 mg/dL. This is often a precursor to diabetes. There are three possible criteria for the diagnosis of diabetes: the presence of symptoms plus a random plasma glucose >200 mg/dL, a fasting (no caloric intake for 8 hours) plasma glucose >126 mg/dL, or a 2 hour post-prandial >200 mg/dL during an OGTT. Diabetes symptoms include increased thirst (polydipsia) and urination (polyuria), hunger, weight loss, blurred vision, frequent infections, nausea, and slow healing time. Some people have no symptoms (American Diabetes Association, 2007).

When diabetes is not well controlled, a number of complications can develop, which can be either macrovascular (cardiovascular disease, stroke, amputation) or microvascular (retinopathy, nephropathy, neuropathy). Regardless of the complication,

the central pathogenic process for diabetes-related complications is advanced glycation end products (AGEs). These AGEs are a result of glucose attaching to proteins, which prohibits the proteins from correctly functioning (Charles, 2002).

Heart disease is the leading cause of diabetes-related deaths (65% of all deaths in people with diabetes). Individuals with diabetes are 2-4 times more likely to develop stroke or heart disease. Besides AGEs, low-density lipoprotein (LDL) oxidation plays a role in CVD development in people with diabetes (Abu-Lebdeh, 2007). Diabetes is the leading cause of blindness among adults 20-70 years old and it accounts for 44% of all new cases of end-stage renal disease (ESRD). Increased kidney volume and capillary pressure lead to an increased glomerular filtration rate and kidney size. With diabetes progression, kidney size continues to grow and the filtration rate decreases (Abu-Lebdeh, 2007). Approximately 60-70% of people with diabetes have mild to severe forms of nervous system damage. Neuropathies are caused by an increase in glycols in Schwann cells which leads to a depletion of adenosine triphosphatase and a slowing of the nerve's conduction. Ischemia from microvascular changes results in a functional loss of exons. A loss of nerve growth factor also plays a role in the development of neuropathies of people with diabetes. With eye disease, reduced blood flow to the capillaries of the eyes and ischemia break the blood-retinal barrier, which cause fluid leakage, edema, formation of microaneurysms, and thickening of the retinas (Abu-Lebdeh, 2007). People with diabetes are at an increased risk for many other diseases and once the disease develops, the prognosis is often worse compared to those without diabetes. (National Diabetes Fact Sheet, 2005)

Treatment of Diabetes

Treatment of diabetes often includes a significant lifestyle change. Healthy eating, physical activity, frequent glucose monitoring, and medication are the basic therapies for diabetes. There are many different types of medications for people with diabetes. Insulin injections are a secondary form of treatment for people with type II diabetes. There are many types of oral medications that aid the body in glucose regulation. Sulfonylureas (glipizide, glyburide) and metglitinides (repaglinide) stimulate the pancreas to make more insulin. Biguanides (metformin) decrease the amount of glucose made by the liver. Alpha-glucosidase inhibitors (acarbose) slow the absorption of carbohydrates. Thiazolidinediones (pioglitazone) make muscles more sensitive to insulin (American Diabetes Association). Sitagliptin (Januvia), a DPP-4 inhibitor, which works by increasing the production of insulin when blood glucose is high and by reducing the amount of sugar that is made by the liver after eating (Merck and Company, 2007) was approved in October 2006 for the treatment of type II diabetes.

There have recently been two new injectable drugs that have been FDA approved for the use in type II diabetes, exenatide (Byetta) and pramlintide (Amylin). Byetta, an incretin mimetic, is taken by those who have failed metformin (a biguanide) or a sulfonylurea to enhance insulin secretion in the presence of hypoglycemia. It is a synthetic version of a naturally occurring hormone that was isolated in the saliva of the Gila lizard. Symlin prevents post-prandial glucose values from going too high. This drug is a synthetic form of the hormone amylin, which is produced with insulin by the pancreas. (American Diabetes Association)

In order to monitor glucose trends, physicians often order a blood test called the hemoglobin A_{1c} (HbA_{1c}, glycosylated hemoglobin). Reactions between glucose, other sugars, and free amino groups lead to glycated forms of hemoglobin. Once glycation occurs, a negative charge allows the hemoglobin to separate, which is referred to as the hemoglobin A₁. The major portion is the hemoglobin A_{1c}, where glucose is the carbohydrate. This form is 4-6% of total hemoglobin. The remaining hemoglobin A₁ molecules contain hemoglobin A_{1A1}, A_{1A2}, and A_{1B}. In people with diabetes, the proportion of A_{1c} is elevated. Laboratories are able to measure the total hemoglobin A₁ or report the specific HbA_{1c}, this is achieved via electrophoresis, cation exchange chromatography, boronate affinity chromatography, and immunoassays.

Glycated hemoglobin circulates within red blood cells whose life span lasts up to 120 days. Therefore, it can provide a method of assessing diabetes control over the preceding 2-3 months. However changes in the previous month are more heavily weighted in the laboratory value. This type of test is not recommended for diagnostic purposes because it is too insensitive to rule out impaired glucose tolerance (Masharani & German, 2007). Physicians will then make treatment recommendations based on this laboratory value that include changes to medication, the adoption of lifestyle changes, and/or the attendance of diabetes education classes.

Research indicated that only about 7% of adults with diabetes manage it optimally (Griffin, 1998). People with diabetes need to adopt self-management skills to manage diabetes. Acquiring the education and support has been necessary to equip people with the knowledge, skills, attitudes, and motivation to effectively manage

diabetes (Department of Health, 1995). The most effective method for educating and teaching self-management techniques is unclear. A systematic review of the literature on the management of diabetes noted that there are important difference and cultural, social structure, and health care delivery (Deakin, McShane, Cade & Williams, 2005).

Research on lifestyle and educational interventions has used a variety of outcomes measures (diabetes knowledge, diet, quality of life, glycemic control) and treatment modalities (group, individual, or computer-assisted). Studies on didactic and involved group sessions, multimedia classes, or inpatient education with follow-up after discharge showed an increase in diabetes knowledge (Scott, Beavon & Stafford, 1984; Bloomgarden et al., 1987; Korhonen et al., 1983; Brown, Duchin & Villagomez, 1992; Tu, McDaniel & Templeton, 1993). The use of more collaborative sessions involving exercise, goal-setting, small group exercises, computer interaction, and education led by fellow patients, have shown an improvement in knowledge and some self-care activities have improved (Campbell, Redman, Moffitt & Sanson-Fisher, 1996; Falkenberg et al., 1986; Wise et al., 1986; de Weerd, Visser, Kok & van der Veen, 1989; de Weerd et al., 1991).

There were a significant number of studies aimed at improving knowledge, attitudes, and self-care skills through lifestyle interventions. These interventions tended to focus on improving nutrition knowledge. One study provided a diet guide, nutrition goals, and had participants keep a food log whereas the control group learned about exchange lists. The intervention group increase applied nutrition knowledge, diet knowledge, and attitude towards life and diet (Kendal & Jansen, 1990). Others which

provided either didactic or participatory sessions had an increase in nutrition knowledge immediately following the intervention, but returned to baseline at 3 months (Wheeler, Wheeler, Ours & Swider, 1985; Agurs-Collins, Kumanyika, Ten Have & Adams-Campbell, 1997).

Another body of literature examined lifestyle behaviors, psychological outcomes, and quality of life. Again most studies focused on dietary changes. A variety of lifestyle interventions were used with many achieving positive outcomes. Interventions included computer-assisted programs, interactive teaching, or weekly sessions by nurses which led to decreased fat, carbohydrate, caloric intake, and more physical activity (Wheeler, Wheeler, Ours & Swider, 1985; Turnin et al., 1992; Wierenga, 1994; Campbell et al., 1990). Only one study found a reduction in weight (Wheeler, Wheeler, Ours & Swider, 1985). Studies that were more informative and knowledge-based, regardless if they were didactic or collaborative, tended to be less beneficial (Norris, Engelgau & Narayan, 2001).

For studies aimed at improving glycemic control, the method of delivery seemed to make a difference. For knowledge-based interventions, those that were more collaborative, repetitious, and longer in duration had more significant results. Lifestyle interventions were not as beneficial (Norris, Engelgau & Narayan, 2001). The interventions were usually held in groups either weekly or monthly ranging in total length from 4 weeks to 20 months (Fernando, 1993; D'Eramo-Melkus, Wylie-Rosett & Hagan, 1992; Lo et al., 1996; Agurs-Collins et al., 1997; Werdier, Jesdinsky & Helmich, 1984; Gilden et al., 1992). A study that had 6 weekly sessions and 18 monthly support

group sessions or 6 weekly sessions or usually care (control group) found that the two intervention groups had decreased HbA1C at 2 years with no differences between the two intervention groups (Gilden et al., 1992). These findings question the utility of the monthly support groups for this group of older (average age was 68) individuals with diabetes. D'Eramo-Melkus, Wylie-Rosett and Hagan (1992) also used two intervention groups with the difference being the addition of two individual sessions and the discussion of barriers and support and found no differences between groups.

In the 1990s, diabetes self-management training evolved from strictly didactic to collaborative and theoretically based (Glasgow & Anderson, 1999). Didactic interventions that focused on increasing knowledge improved it but had mixed results with respect to glycemic control and no effect on weight. Collaborative interventions focusing on knowledge improved glycemic control in the short-term. Lifestyle interventions were generally more effective in group settings especially for weight loss and skills teaching (Norris, Engelgau & Narayan, 2001). Other factors have been shown to be crucial in achieving adequate long-term diabetes control and changing attitudes and motivations were vital (Korhonen et al., 1983; Lockington et al., 1988). It has been noted by Anderson (1990) that effective diabetes management must be simple, individualized, reinforced, incorporate social support, and be tailored to an individual's habits and routines in order to be effective. Additionally, a number of factors related to ethnicity and acculturation have been shown to affect diabetes control.

Diabetes and Hispanics

When ethnicity has been examined specifically, the rates of diabetes differ depending on the group. Of non-Hispanic whites, 8.7% over age 20 have diabetes, 13.3% of non-Hispanic blacks, and 12.8% of American Indians/Alaska Natives have diabetes, according to 2005 data. Type II diabetes is 1.7 times higher in Latino than non-Latino whites. Of all Latino-Americans, 9.5% aged 20 years or older have diabetes (Diabetes Fact Sheet, 2005). Diabetes is the 4th leading cause of death among Hispanic women and Hispanic elderly and this population is twice as likely as other populations to experience diabetes-related complications. Diabetes has an earlier onset in Hispanics with the age of onset between 30 and 50 years old. Among Hispanics between 45-74 years old, the prevalence rate is nearly 24% (National Diabetes Education Program, 2005). Besides having an increased risk of diabetes, the rate of diabetes-related complications, severity of hyperglycemia, and mortality rates are higher in Mexican-Americans compared to Caucasians (Haffner et al., 1989; Vega & Amaro, 1994; Okosum & Dever, 2002). Hispanics have poorer glycemic control than Caucasians (Brown et al., 2003).

With the health of Hispanics with diabetes worse compared to Caucasians, researchers speculated that health disparities were multi-factorial, but largely attributed to poorer access to health care and the receipt of lower-quality care (Hargraves, Cunningham & Hughes, 2001). Even in settings where healthcare services were universally available, disparities remained for Latinos with diabetes (Welch et al., 2006). Therefore, additional factors have affected health outcomes of Latinos. The affect of

acculturation on diabetes management in Latinos has shown negative, positive, and mixed results (Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005). Cultural factors influence patients' perceptions and assumptions about illness, the etiology of the disease, the treatment, and from whom to see treatment (Walsh, Katz, & Sechrest, 2002). It is an important factor that influences patient adherence and the patient-doctor relationship among Hispanic patients (Barron, Hunter, Mayo, & Willoughby, 2004). A study of Mexican-Americans with type II diabetes found that those who followed recommended guidelines had a belief in the power of modern medicine, the desire to act and feel "normal", the desire to avoid physical symptoms, and limited economic resources. These factors, together, determined patients' decisions regarding daily self-care behaviors (Hunt, Pugh, & Valenzuela, 1998).

The San Antonio Heart Study revealed that Mexican-Americans with more acculturation had less rates of diabetes and obesity (Hazuda, Haffner, Stern, & Eifler, 1988). Another seminal article around the same time showed that acculturation had no effect on diabetes prevalence (Harris, 1991). On the contrary in Arizona, diabetes was associated with higher acculturation in a group of Mexican-Americans (West et al., 2002). In comparing Mexican-Nationals and Mexican-Americans, rates of diabetes were higher among those living in the U.S. (Burke, Williams, Haffner, Villalpando, & Stern, 2001). Those same individuals were less physically active and had higher fat diets (Stern, et al. 1992). Brown et al. (2000) found no significant correlation between HbA1C and acculturation in a sample of Mexican-Americans.

Studies have compared Hispanics whose primary language was Spanish versus English. Results were significant between language spoken and glucose control, however there were differences in self-care behaviors. Spanish-speaking individuals were medically managed less aggressively (less insulin was prescribed), and less likely to understand prescriptions, monitor blood sugars at home, have annual eye exams, or lose weight (Lasatorl, Davidson, Steiner & Mehler, 2001; Sundquist, Winkleby & Pudaric, 2001). A large multicenter study of diabetes in managed care found few differences between English and Spanish speaking Latinos, although English speaking Latinos had higher blood pressure. Few differences were found in health behaviors, processes of care, and outcomes of care between the English and Spanish speaking Latinos and it was hypothesized that language barriers may be attributed to patient-provider language concordance or availability of adequately trained translators (Brown et al., 2003). In a group of Latinos with either diabetes or hypertension, those whose primary language was Spanish were less acculturated. However, regardless of language, Latinos reported a healthier view of their future, felt less distressed about their health, and had fewer days where pain interfered with daily activities (Perez-Stable, Napoles-Springer & Miramontes, 1997).

Type II diabetes has been highly correlated to obesity. In data comparing Mexicans and Mexican-Americans, obesity has been implicated in the 28% increase in incidence in obesity in Mexican-Americans compared to Mexicans (Williams, Stern, & Gonzalez-Villalpando, 2004). Higher acculturation status was the strongest correlate of obesity, even more so than exercise and diet (Hubert, Snider & Winkleby, 2005). In

general, Hispanics were less likely to monitor their diet compared to Caucasians and African-Americans respondents (Oster et al., 2006). Eating less fruits and vegetables was associated with being more acculturated in a group of Mexican-Americans (Neuhouser, Thompson, Coronado & Solomon, 2004; Gregory-Mercado et al., 2006). Less fat and more fiber and vitamins were consumed by Mexican-born individuals compared to those born in the U.S. (Dixon, Sundquist & Winkleby, 2000).

Acculturation

Acculturation has been defined as psychological changes that occur when individuals originating from one culture immigrate to a new host culture (Burnam et al., 1987). It has also been defined as the process by which individuals change in response to contact with another culture (Berry, 1990). This process can occur voluntarily among immigrants or involuntarily among indigenous people and refugees (Dana, 1996).

The process of acculturation is thought to lead to four possible alternatives: assimilation, integration, separation, and marginalization (Berry, 1990). In assimilation, individuals relinquish their cultural heritage and identity and embrace the cultural identity of the host culture. This suggests that later generations of migrants become less distinctive as a socioeconomic group as they move farther away from the migration experience (Oropesa & Candale, 1997). This assumes a linear progression, however research indicates that it is not that simple (Lopez, Haigh, & Burney, 2004). Those who have integrated have embraced the host's culture without relinquishing the values, beliefs, and practices of the culture of origin. This type of individual would speak the language of both cultures, participate in economic, social, and political domains of the

host country, and develop friendships with people originating from the host country. For those who are in the separation stage, they maintain a close tie to their cultural heritage and do not adopt the culture of the host country. Finally, marginalization represents a loss and alienation in which people reject their own cultural heritage and the culture of the settlement. Berry and Sam (1998) found a positive correlation between being integrated into the host culture and healthy psychological adaptation during the acculturation process.

A major focus of acculturation research has been in studying the difference between Mexican-Americans and Anglo-Americans. According to the U.S. Census (2001), Mexicans accounted for 12.5% of the U.S. population. A majority of the Hispanics in the U.S. settle in Texas, New Mexico, California, or Arizona (U.S. Census, 2001). If research includes relevant cultural variables, a better understanding of health outcomes might be possible. It can serve as a way to understand the role of culture on psychological well-being. Acculturation for Latinos can be complex and mediated by numerous variables such as previous experiences, education, and money. According to the census, 22.6% of the Latino population was under poverty level and 52.4% of this population earned a high school education. In comparison, non-Hispanic Whites had a poverty rate of 8.1% and 83.6% of the population had a high school diploma (U.S. Census, 2001).

There is a body of literature that examines acculturation in terms of language used, social support, economics, depression, and general health. In general, immigrants who were the most acculturated had the most depressive symptoms, more

psychological disorders, greater exposure to stress, and the poorest family cohesion (Finch & Vega, 2003; Arcia et al., 2001; Lopez, Haigh, & Burney, 2004; Miranda & Matheny, 2000). Among Latin American migrants, those who reported high levels of hardiness appeared to have lower levels of perceived stress. Those who were committed to life goals, had a sense of control of their future, and accepted change as a challenge appeared to be better prepared, psychologically, for the migration experience (Lopez, Haigh, & Burney, 2004). Some refer to this as the healthy migrant effect, whereas only healthy people were allowed to migrate (Landale et al., 1999; Nazroo, 1997). However, people who came to the U.S. without adequate social support may be more susceptible to strain associated to migration. As this strain accumulated due to the loss of native culture, the use of poor health behaviors, attenuated aspirations, and longer periods of stress, the risk of poorer health among the more acculturated Mexican-Americans increased (Finch & Vega, 2003). Also, attributing to stress was reduced effectiveness of coping resources, use of the Spanish language, limited length of residence in the U.S., low levels of acculturation, and high levels of family cohesion (Mirando & Matheny, 2000).

Most Hispanic groups in the U.S. had lower rates of morbidity and mortality for some diseases compared to Native Americans (Sorlie, Backlund, Johnson, & Rogot, 1993). Cardiovascular disease risk factors were higher in U.S. born compared to foreign born immigrants and were even higher in highly acculturated Mexican-Americans (Sundquist & Winkleby, 1999). Culture and SES were found to be two of the most prominent social influences on body weight (Garinet & Pollock, 1995). This was closely

followed by cultural patterns and beliefs (Balcazar, Castro, & Krull, 1995). U.S. born Spanish speakers had significantly larger waist circumferences compared to U.S. born English speakers (Popkin & Udry, 1998). The least acculturated were also less likely to avoid diets high in fat (Woodruff, Zaslow, Candelaria, & Elder, 1997). Some immigrants believed that job pressures, having a fast-paced lifestyle, and the availability of unhealthy, fast-food affected healthy behavior after migration (Sanjur, 1995).

In a study by Khan, Sobal, and Martotell (1997), it was found that an increasing preference for English was associated with a decrease in body mass index (BMI) of Mexican-Americans. This relationship between acculturation and BMI was stronger in Mexican-American than in Cuban or Puerto Rico-Americans, which suggested a complex relationship between culture and other factors within Hispanic subgroups in the U.S. However, more acculturated Puerto Ricans and Cubans were found to have high prevalence rates of obesity (Gordon-Larsen, Harris, Ward, & Popkin, 2003). Bertera, Bertera, and Shankar (2003) found that percent over ideal body weight was associated with acculturation but not with SES measures in a Salvadoran population living in the Northeast U.S. Gordon-Larsen et al. (2003) similarly found that acculturation had a greater impact on obesity than proximate factors such as physical activity, diet, and smoking behavior. Moving to the U.S. often forced an individual to embrace the ideals of Americans. Being overweight may be acceptable in their birthplace, however mainstream American culture shies away from those who are overweight. How health is perceived and manifested are ethno-cultural concepts (Omer, Owen, & Suggs, 1999). Sometimes a larger body size was indicative of high SES.

Similar results were also found in breast cancer screening among Hispanic women. O'Malley, Kerner, Johnson, and Mandelblatt (1999) discovered, after controlling for covariates, women who were more highly acculturated were significantly more likely to have obtained a clinical breast exam and received a mammogram both recently and historically compared to less acculturated women. This additional evidence reinforces the importance of acculturation in the practice of healthy behaviors.

A "Hispanic Paradox" has been suggested because it seems that SES and acculturation have negative effects on the health of Hispanic-Americans. Research suggested that higher acculturation and SES may lower weight, but it may generate increases in other health risks such as increased use of tobacco, alcohol and high fat diet. Scribner (1996) described this as a group level correlation between ethnicity and mortality that cannot be explained in terms of an individual-level model. He stated that biomedicine has explained the increased risk associated with ethnicity, however the health outcomes of Mexican-Americans were contrary to those individual-level models of risk. The paradox of Hispanic health indicated that group-level associations between ethnicity and mortality have been inappropriately reduced to causal inferences at the individual level leading to ecologic fallacy. Because of the many factors related to health behavior change, which is evident from the research with Hispanics and diabetes, psychological theories have been developed that try to explain people's actions regarding change.

Theory of Reasoned Action/Theory of Planned Behavior

The development of the theory of reasoned action (TRA) and the theory of planned behavior (TPB) originated in social psychology. In the 1960s, social scientists began to review attitudes and behavior predictors. As a result, Fishbein and Ajzen explored ways to predict behaviors and outcomes. They assumed that individuals were rational and made systematic use of information available to them. Their framework, the TRA, looked at behavioral intentions rather than attitudes as the predictors of behavior (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). The authors realized that there was a severe limitation with people who felt they had little power over their behavior and attitudes, therefore the concept of perceived behavioral control was added to the model and it became known as the TPB (Ajzen, 1985).

The purpose of the theory was to predict and understand motivational influences on behavior that is not under the individual's volitional control, to identify strategies for changing behavior, and to explain any human behavior. As mentioned previously, it assumed that humans were rational and systematically use information and that people consider consequences of actions before engaging or not engaging in the behavior (Ajzen & Fishbein, 1980; Ajzen, 1985).

According to the theory, the most important factor in determining one's behavior is intent, which is a combination of attitudes toward performing the behavior and subjective norms. Intentions can change over time especially if a long time has passed between intentions and behavior because other events change intentions. The attitudes toward the behavior include behavioral beliefs, evaluations of behavioral outcomes,

subjective norms, normative beliefs, and the motivation to comply. Attitudes were a person's positive or negative belief about performing a specific behavior. If a person believes the outcome for doing something will be positive, that person will have a positive attitude toward performing it. If others see it as positive as well, the individual will be motivated to meet others' expectations and a positive subjective norm is expected, this increasing the likelihood that the behavior will occur. The intent to perform a behavior depends upon the product of attitude and subjective norm. (Ajzen & Fishbein, 1980) In a meta-analysis of intention to use condoms, attitudes and subjective norms from the TRA were supported (Sheeran & Taylor, 1999).

The TRA has worked the best when applied to behaviors that were under a person's volitional control. If this is not the case, the TPB was better applied. It can account for behavior on a continuum of volitional control. As mentioned previously, the difference between the TRA and the TPB was the addition of perceived behavioral control. This was comprised of control beliefs and perceived power. A person's motivation was influenced by how difficult the behaviors were perceived to be as well as the perceptions of how successful the individual can be. A meta-analysis by Armitage and Conner (2001), across many topics, found that perceived behavioral control was the most important factor in the model and that it could independently predict intention. Because of this, the TPB was viewed as more superior than the TRA.

These theories have been applied to health education in order to predict and understand healthy and unhealthy behavior, however some limitations have been identified. Personality and demographic variables were not considered in either mode.

There has been difficulty in how to define perceived behavioral control and subsequently measure it. It assumed that perceived behavioral control predicted actional behavioral control, which may not always be true. The TPB was only applied when the behavior was not under volitional control. The longer the time between intent and behavior, the less likely that it will occur due to the influence of other events. Finally, the theory was based on the assumption that humans were rational and make systematic decisions. It doesn't take into account unconscious motives (Godin & Kok, 1996). Further, Sheppard, Hartwick, and Warshaw (1988) suggested that change should be made to the TRA to account for goal intentions, choice situations, and differences between intentions and estimation measures. Therefore, these models were not comprehensive and lacked factors that may be crucial in describing health behavior of multiple groups.

Transtheoretical Theory/Stages of Change

The transtheoretical model of behavioral change (TTM) emerged in the 1970s by Prochaska and DiClemente from a comparative analysis of change systems used in psychotherapy to treat addictive behaviors. This model treated behavior change as dynamic rather than an "all or nothing" with individuals moving through a series of stages. The stages were characterized by a temporal dimension of "readiness" to change (Prochaska & DiClemente, 1983). There were 5 stages included in this model. The first was the precontemplation stage where there was no intention to engage in the behavior or acknowledge a problem behavior. People were likely to deny the extent of a problem and its influence on others. Contemplation involved thinking about starting to

change a behavior within the next six months. Preparation involved making a commitment to make a change. In the action stage, the person has engaged in the behavior changes for less than six months. Finally in maintenance, the behavior has been performed for longer than six months (Marshall & Biddle, 2001).

Three factors have been thought to mediate the process of going from stage to stage. This included self-efficacy for change, the decisional balance of perceived advantages and disadvantages of change, and the strategies and techniques used to modify thoughts, feelings, and behaviors (Marshall & Biddle, 2001).

More recent research has led to the thought that stage progression is more likely to follow a cyclical pattern where people can move forward and backward in an effort to reach maintenance (Prochaska, DiClemente & Norcross, 1992). The model was originally intended for individuals to move in a linear fashion.

The TTM has long been used to examine smoking cessation and physical activity, but there have been some criticisms. Some reject stage-based theories of human behavior (Bandura, 1997). The value of the TTM relative to other models of health behavior depends on the health problem being studied, as well (Rosen, 2000). Others have questioned methodological or analytical issues about existing evidence that supports the TTM (Ashworth, 1997; Sutton, 1996; Weinstein, Rothman & Sutton, 1998).

A number of models have been proposed to explain why people either begin to change a behavior or have been successful in doing so for an extended period of time. Based on a review of the literature, critics of the theory of reasoned action/theory of planned action and transtheoretical theory believed that they were not comprehensive

enough models and, perhaps, other models had better explanatory methods. The health belief model, reviewed next, has received considerable more attention in the literature, especially with respect to diabetes.

Health Belief Model

The health belief model (HBM; Figure 1) was originally developed to explain preventive health behaviors against a disease that a person did not yet have (Bond, Aiken, & Somerville, 1992). The components of the HBM are derived from a variety of psychological and behavioral theories that hypothesized that behavior depends on two variables: 1) the value placed on a particular goal and 2) the individual's estimate of the likelihood that an action will achieve that goal. Questions designed to assess this dimension have included things such as one's belief in the diagnosis, susceptibility to illness, and estimates of receptibility (Becker & Maiman, 1980).

The health belief model, initially developed by Kasl and Cobb (1966), stated that the likelihood of a person engaging in preventive health care behavior depended on the amount of perceived threat of the disease, and the perceived value of the action prescribed to reduce threat. Perceived threat was a function of how important health was to the person, the person's perceived susceptibility to the disease, and the perceived seriousness of the consequence of the disease. The dimension referred to as perceived susceptibility refers to one's subjective perception of the risk of contacting a condition (Becker & Janz, 1985). The value of the action was determined by the perceived probability of the action leading to the desired preventive health state and the "cost" of taking the action. Readiness to act variables seemed to predict health

promotion and disease-detection activities, whereas perceived benefits was important in treatment compliance. Examining perceived benefits reflected a focus on the immediate disorder and its relief, whereas health promotion was long-term (Brownlee-Duffeck et al., 1987; Bond, Aiken, & Somerville, 1992; Harris & Linn, 1985). Other variables such as health care utilization, demographics, and disease knowledge were also included. In an attempt to account for sick role behavior, Becker (1974) added enabling and modifying factors to the model.

Rosenstock (1966) described something similar to Kasl and Cobb's framework, however, Rosenstock's model expanded the costs of taking action into a cost-benefit variable where the person weighed the benefits of the preventive action against the liabilities. He also re-examined cues to action by identifying them as signals that suggest to a person of health risk to make a health behavior change. Becker has done extensive empirical refinement of the model. He tied the model to rational belief theory and expectancy theory. Expectancy-value theories suggest that people learn to expect or believe that certain behaviors lead to a valued outcome. These outcomes are positive or negative and people learn to behave to get the desired outcome. The value attached to the outcome depends upon individual perceptions of how a disease will interfere with future health or jeopardize personal goals (Given, Given, Gallin, & Condon, 1983).

There are two types of expectations that determine the probability that a person will engage in behavior thought to bring a particular outcome. People must believe that they can perform behaviors that lead toward the desired outcome and away from the negative one. Motivation to perform therapeutic outcomes can be thought of as a

weighted function of the value of the positive outcome, the perceived benefits of the behaviors if performed correctly, and the subjective probability that barriers of the behavior can be overcome. This equation represents a person's subjective utility for engaging in health related behaviors (Given et al., 1983).

Rosenstock (1966) saw health decision making as a process with a series of phases. Along the way, an individual interacts with others and events and engages in self-perception of symptoms. He also noted that health is an elusive concept where what one perceives as healthy may not be considered healthy by others. Most are ready to act once they realize they are at risk for health problems. Situational factors in the HBM account for adverse habitual behaviors. Patients have developed a variety of health-related attitudes and beliefs affecting their decisions about the necessity and the desirability of following the health professional's advice. Health beliefs learned from family, friends, and other personal experience are also added to this (Becker & Janz, 1985).

Perceived severity refers to feelings concerning the seriousness of contracting an illness or the consequences of leaving it untreated. It includes the evaluation of medical and clinical consequences such as pain and disability and positive social consequences such as various effects of the illness on social and job-related obligations (Becker & Janz, 1985).

Perceived benefits, another dimension, includes beliefs regarding the effectiveness of various actions available in reducing the disease threat. This dimension was developed because it was believed that acceptance of vulnerability to a condition

believed to be serious was thought to lead to preventive behavior, however the course of action likely taken was not taken into consideration by the model. Therefore, a sufficiently threatened individual would not be expected to accept the recommended health action unless it was perceived as feasible and efficacious (Becker & Janz, 1985). A cost-benefit analysis is thought to occur where the individual weighs the action's effectiveness against perceptions that may be unpleasant or inconvenient such as side effects or iatrogenic outcomes (Becker & Janz, 1985).

Applying the HBM to different models of disease can provide information about the minimal levels of the model's elements needed to induce compliance to the disease treatment regimen. Health care providers can tailor interventions to suit the needs of each patient based on components of the HBM. Given et al. (1983) suggests that in order to identify each patient's needs, an assessment should be used to identify beliefs about abilities to control effects of the disease, the barriers to and the support for carrying out the treatment regimen, and beliefs regarding that treatment. Once this occurs, health professionals can interact with patients to devise strategies that will alter beliefs and subsequent health behaviors. A standardized measurement of the components of the HBM would facilitate evaluation and analysis of the data (Becker & Janz, 1985).

Health Belief Model and Hispanics

Hispanics are the largest minority group in the U.S. as approximately 12.5% of the total population identified themselves as Hispanic or Latino. Of the 12.5%, 58.5% of them were of Mexican descent (United States Census Bureau, 2005). Few studies

have reported the health belief model's applicability to Mexican-Americans (Rodriguez-Reimann et al., 2004). Schwab et al. (1994) studies Mexican-Americans with diabetes from a HBM framework and found only two variables, benefits and barriers, were reliable for this population. Also noted were that perceived susceptibility and perceived severity were not reliable. A literature review combining the HBM and Hispanics found limited results, however what did exist often compared Hispanics to Caucasians. In a recent study, Chen Fox, Cantrell Stockdale, and Kagawa-Singer (2007) examined racial barriers to flu vaccination. They discovered that Latinos were not concerned about getting influenza and believed that they were less susceptible to the influenza when compared to Caucasians, $p < .01$. Similar results were obtained when examining breast self-exam behavior in Hispanic women. They were less likely to perceive themselves as susceptible to breast cancer and to perceive breast cancer as curable when compared to Caucasians and African-Americans (Fulton, Rakowski, & Jones, 1995). Hyman et al. (1994) examined the HBM variables of susceptibility to breast cancer, and perceptions of benefits of and barriers to mammography as it related to mammography utilization. Noncompliance tended to be found in Caucasians, those who perceived fewer benefits of and barriers to mammography and those who had a family history of cancer. Like previous research, Hispanics were found to believe that they were more susceptible to breast cancer when compared to Caucasians. Compliance rates for scheduling and completing mammography was higher when compared to Caucasians. This higher rate of compliance was contrary to previous research.

A unique study that compared the health beliefs of Hispanic, Vietnamese, and Cambodian American women found that the Hispanic and Vietnamese were the most similar. In examining beliefs about cancer screening practices, McGarvey et al. (2003) found that Hispanic women had more health related motivation, more self-confidence, and more susceptible to getting cancer, $p < .001$. These three groups of ethnic minorities all reported that cancer was a more serious condition than do Caucasian women. Hispanic women were also confident in their ability to detect breast cancer and believed that there were benefits in conducting breast self-exams, however the magnitude of the barriers was high.

In a study of breast-feeding practices among Hispanics, it was found that individuals' perceptions (perceived control, perceived threat, perceived benefits) had no relationship with the decision to continue breast-feeding 6 weeks postpartum. Modifying factors (demographic characteristics, interpersonal, and situational variables) had no or little relationship with breast-feeding except for the influence of the husband/partner. The likelihood of action (perceived barriers, likelihood of taking preventive action, and cues to action) factor did not contribute to breast-feeding behavior except for cues to action. Timing of the feeding decision and father's opinion of the feeding method was related to breast-feeding. Since significant variables were found between all HBM constructs, the HBM was found to be useful in the prediction of breast-feeding (Sweeney & Gulino, 1987).

With the study of HIV, a conceptual model was developed by Newcomb et al. (1998), which posits that predictor variables (demographics) influence mediators

(beliefs and attitudes; HBM constructs), which affect outcomes (sexual behavior). The HBM has been examined with respect to behavior associated with the spread of HIV/AIDS. In a study of college students who were questioned about HIV/AIDS and sexual behavior, all factors of the HBM predicted current sexual behavior and behavior changes. The HBM accounted for 8-18% of current behavior and behavior changes. Susceptibility, self-efficacy, and social support were the most important predictors of sexual behavior. In general, high scores for these variables were characteristic of students practicing safe sex (Steers, Elliott, Nemiro, Ditman, & Oskamp, 1996). With Latinas, being younger, single, perceiving high susceptibility to HIV, and having a high health locus of control being attributed to more behavior changes (Newcomb et al., 1998).

Health Belief Model and Diabetes

According to the HBM, people with diabetes will adhere to treatment plans if they are concerned about their health and believe that they are susceptible to problems, believe that diabetes could have serious consequences, believe that following medical recommendations will reduce threats, and believe that the benefits outweigh the costs of not adhering (Chapman, Ham, Liesen, & Winter, 1995). The HBM has been selected as the model to investigate the values and expectations held by patients who have diabetes because it described how behavior is influenced by uncertainty and it identified fundamental attitudes and subjective opinions of the person with diabetes (Svensson, Ludvigsson, & Richt, 1982).

A variety of cross-sectional designs using a variety of disease specific instruments have been used to study health beliefs and diabetes (Whittemore, 2000). The diabetes treatment regimen is complex, requires significant behavioral changes, and is lifelong. This has resulted in attempts to understand the dynamics of adherent and non-adherent behavior to further refine treatment plans. Becker and Janz (1985) have urged researchers to use the HBM as a framework for understanding and enhancing patient adherence to the diabetes treatment regimen. They concluded that focusing on relevant identified attitudes and beliefs will aid in the treatment of people with diabetes.

Barriers to treatment were significantly related to self-management and perceived severity of diabetes was significantly associated with glycemic control (Polly, 1992). People with poorer glycemic control reported greater severity of diabetes. This is congruent with the HBM in that if people believe their disease is severe, they are more likely to perform the behaviors that contribute to improved glycemic control (Polly, 1992). Harris, Lynn, Skyler, and Sandifer (1987) found that the best predictor of diabetes self-management was lack of psychosocial barriers followed by environmental barriers and perceived susceptibility to health complications; these factors combined to account for 15% of the variance in adherence. However, Wilson et al. (1986) found that health belief variables accounted for 50% of the variance in adherence. Bond, Aiken, & Sommerville (1992) found that HBM components predicted 23-25% of the variance in compliance. This is slightly better compared to Brownlee-Duffect et al.'s (1987) results which found that HBM accounted for 20% of the variance in glycosylated hemoglobin

for adolescents/young adults and 19% for the older sample. For reported adherence, the HBM account for 52% of the variance of the younger sample and 41% for the older sample. Varying data raise questions about which factors may be mediating and moderating the relationship between health beliefs, adherent behavior, and glycemic control (Whittemore, 2000). Additional analyses showed that commitment to the benefits of adherence to the treatment regimen had a significant direct effect on glycemic control and perceived barriers had a significant indirect effect through adherence (Brown & Hedges, 1994). Polly (1992) argues that other demographic variables, financial strain, and social support play a part in shaping health behaviors.

Components of the HBM have been implicated as important indicators in self-care behaviors in people with diabetes. Perceived barriers ($p < .04$) were significant in moderate exercise, binge eating, and closeness to following an ideal diet (Aljasem, Peyrot, Wissow, & Rubin, 2001). More specifically with exercise behavior, non-exercisers found more barriers to and fewer benefits from exercising, although susceptibility to diabetes-related complications scores between exercisers and non-exercisers were approximately the same (Koch, 2002). In a group of African-Americans, shared values and goals to understand diabetes self-care and eliminate the disparity contributed to the HBM variables of perceived benefits and barriers (Scollan-Koliopoulos, 2004). Self-efficacy ($p < .03$) was implicated in binge eating, closeness to following an ideal diet, skipping medication, testing blood, and adjusting insulin (Aljasem et al.) These authors recommended incorporating tasks that build self-efficacy into treatment because it allows the person to overcome obstacles.

Becker and Janz (1985) suggested that the HBM may be beneficial to diabetes care and research since some perception and beliefs can be influenced by health care providers. Perceived misunderstanding of the seriousness of the disease can contribute to a lack of initiative to make lifestyle changes, especially for individuals with non-insulin dependent diabetes. For some, the thoughts of developing a diabetes-related complication related to perceived seriousness (Scollan-Koliopoulos, 2004). Dietrich (1996) reported that people with non-insulin dependent diabetes described that they did not alter their lifestyle until insulin was prescribed or complications developed as a result of misunderstanding the severity of the disease. Becker and Janz (1985) found that sometimes people will have a lack of faith in the efficacy of aspects of the treatment plan. In these cases, people's perceptions of benefits are too low and health care providers must emphasize the value of adherence to delay/prevent acute and long-term complications of diabetes.

Sometimes people with diabetes may behave in a non-adherent way due to perceptions of barriers to carrying out different elements of the regimen such as diet or glucose monitoring (Becker & Janz, 1985). Some studies have reported that diet and exercise generated the most problems, whereas others have found that time, competing priorities, social events, difficulty resisting temptation, and negative emotions have been the most frequently named barriers (Glasgow, McCaul, & Schafer, 1986; Sullivan & Joseph, 1998; Estey, Tann, & Mann, 1990; Schlindt, Rea, Kline, & Pichert, 1994; Travis, 1997). In general, individuals have varied in their perception of the severity of barriers and how it was related to compliance. People with diabetes

usually do better if individual counseling has been conducted to address ways of integrating the diabetes regimen into one's current lifestyle (Estey, Tan, & Mann, 1990). In a study of Chinese individuals with diabetes there was a link between a lack of seriousness about diabetes and susceptibility to diabetes complications. More adherence was found among those who had overt symptoms. Level of education even played a role whereas perceived susceptibility to diabetes complications and perceived seriousness increased with level of education (Tan, 2004). With regard to perceived susceptibility in diabetes-related lower extremity amputation, foot deformity, obesity, and hypertension played a factor (Scollan-Koliopoulos, 2004).

Bond, Aiken, and Somerville (1992), in a study of adolescents with insulin dependent diabetes, found that the HBM construct of cues to action most closely associated with adherence. This occurred in the direction expected according to the model. Benefits-costs were also directly associated to compliance, especially for young adults (Bond, Aiken, & Somerville, 1992; Brownlee-Duffect, 1987). Perceived severity and susceptibility explained a significant portion of glycosylated hemoglobin for this same group of young adults. For older adults, perceived benefits accounted for significant portions of self-reported adherence and glycosylated hemoglobin (Brownlee-Duffect et al., 1987).

Threat was indirectly associated through an interaction effect with benefits-costs. With low benefits-costs, threat was positively related to compliance. However with high benefits-costs, a negative relationship with threat was found in relation to glycemic control. They hypothesized that high threat may diminish the impact of the perceived

benefits of the recommended medical regimen (Harris & Linn, 1985). With regard to perceived threat in a group of African-Americans as it related to amputation, anticipatory fear, desire to minimize risk, and causal beliefs were all related (Scollan-Koliopoulos, 2004). In another study of adults, perceived severity of illness most related to compliance, and health beliefs were better predictors than compliance (Harris & Linn, 1985; Alogna, 1980). Glycosylated hemoglobin improved by 15% in patients who reported a more positive attitude after an education program, while it improved 24% in those who felt diabetes was more distressing and more difficult after the end of the program (Dunn, Beeney, Haskins, & Turtle, 1990). Schatz (1984) conceptualized the HBM as being a flexible model and researchers interpreted the factors as general health motivators, susceptibility, faith in providers, and characteristics of the doctor-patient relationship. Results indicated that the HBM predicted compliance in adults because the strongest predictor of compliance was its interaction with health care providers. Positive patient-provider relationships were conceptualized as representing the low barriers aspect of the HBM.

It has been demonstrated that people with type II diabetes who have discontinued follow-up or do not attend clinic appointments as scheduled tend to be in poorer health and have worse glycemic control than people who attend regular follow-up visits (Jacobson, Adler, Derby, Anderson, & Wolfsdorf, 1991). Although there may have been many reasons for failure to attend appointments, Jacobson et al. (1991) found that people did not attend because they had no interest in discussing treatment

with their physician. Poor attendance was not due to lack of health insurance or transportation problems.

Environmental barriers may also play a role. People often report that family responsibilities, lack of economic resources, lack of transportation, poor time management, and lack of knowledge results in interference with lifestyle changes necessary to be compliant with the diabetic treatment regimen (Irvine, 1989). Similarly, consequences of adhering such as increased risk of hypoglycemia or weight gain has posed as barriers to compliance. Self-monitoring of blood glucose levels may act as a punishment because this information may indicate a low or high blood sugar and the individual may have thought that he followed all of his doctor's recommendations with respect to diet and exercise but his blood sugar was still not in the acceptable range (Jones, 1990). Consequently, patients are more likely to test their blood sugar on days they have been compliant.

Acculturation and Health Belief Model

Different models have been developed within the health belief model for different ethnic groups and gender. This has been done for tuberculosis prevention, cancer screening, and condom use (Rodriquez-Reimann et al., 2004; Byrd, Peterson, Chavez, & Heckert, 2004; Vadaparampil et al., 2003; Borrayo, Guarnaccia, & Mahoney, 2001; Norris & Ford, 1995). Studies indicate that models for Caucasians, African-Americans, and Mexican-Americans are all substantially different and can even be different for men and women (Neff & Crawford, 1998) In mammography adherence, health belief model's variables explained 13% of the variance for Caucasians and 9%

for African-American women (Vadaparampil). These groups showed significantly differences in how the health belief model's variables were manifested, including self-efficacy, income, and fear. Self-efficacy was essential for Caucasians, whereas African-American women put importance in income and fear. These groups also approach health care differently, individualistic versus community approach (Vadaparampil).

When studying Mexican-Americans, acculturation was the variable studied most often. Having a high level of acculturation may affect adherence to medical treatment plans (Anderson & Funnell, 2000; Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005). Globally, those who are more highly acculturated engage in cancer screening behavior (Byrd et al., 2004). Those who were less acculturated had higher perceived susceptibility, seriousness, barriers, and greater attention to cues. There were even gender differences within these Mexican-Americans, where as women perceive more benefits, attend to more cues, and intend to engage in the behaviors to a greater degree than men with regard to tuberculosis prevention. Perceived threat did not take a significant role for these Mexican-Americans (Rodriguez-Reimann et al., 2004).

In order to develop a working model for condom use, Norris and Ford (1995) combined concepts from the health belief model, theory of reasoned action, and construct accessibility model. Norris and Ford found different models for Caucasians, African-Americans, and Mexican-Americans and within these groups, there was additional descriptive models for men and women. With breast cancer screening, no one theoretical model was sufficient for Hispanic women (Gonzales, Attwood, Garcia, & Meyskens, 1989; Rajaram & Rashidi, 1998). Borrayo, Guarnaccia, and Mahoney (2001)

found a negative relationship between perceived benefits and breast self-exam compliance, which they believed were moderated by cultural health beliefs. For this model, perceived confidence was the biggest indicator of compliance. They discovered that using behavioral concepts were more appropriate for this population. For the prediction of breast cancer screening behavior, HBM constructs, as they currently stand, provide limited use.

The literature, somewhat consistently, reported the low levels of acculturation were associated with lower use of health services and that there were associations between acculturation, and health status and health behavior, but there lacked a model which resulted in opposing findings that lead to poor generalizations (Arcia, Skinner, Bailey, & Correa, 2001). The basic assumption was that immigrants adapt the cultural practices as a result of interaction with the host culture. Early U.S. models assumed that acculturation was inevitable and value American cultural characteristics over those of other immigrant groups (Teske & Nelson, 1974).

More modern models less emphasize this and allow for more diverse outcomes and allow for personal choice. They recognized that many immigrants were grounded in two cultures and that successful acculturation did not necessarily mean abandoning their cultural background (LaFromboise, Coleman, & Gerton, 1993; Chavez, 1994). Contemporary models acknowledged the effects of environmental, familial, demographic, and other factors on the outcomes of acculturation (Miranda & Umhoefer, 1998). Psychosocial assessment has been shown to be useful first steps in constructing behavioral interventions that lead to greater patient involvement and better control of

chronic disease (Green, Lewis, & Levine, 1980). It was important to explore how ethnic differences might affect the predictive power of the HBM (Steers et al., 1996). To date, there were no studies that use all of the health belief model's constructs in a model for Mexican-Americans (Borrayo, Guarnaccia, & Mahoney, 2001).

Purpose of Current Study

Due to a high number of Mexican-American immigrants living in the U.S., their presence affects health care as a whole. There is also a such high number of these individuals with diabetes, that it is paramount that healthcare personnel fully understand the cultural influence on the health beliefs and management of chronic disease, especially diabetes. The health care system is bombarded with Hispanics with diabetes who have unique needs that traditional practicing health care personnel may be adequately prepared to treat these patients to achieve the treatment recommendations set by the American Diabetes Association (ADA) and the Association of Clinical Endocrinologists (ACE).

The health belief model was developed over thirty years ago and the role of culture in health beliefs was largely ignored at that time. Because the demographics of the United States have significantly changed and continue to change it is imperative that research be conducted to determine the utility of the health belief model as it currently stands since it is still a model that is often cited. Few studies have reported the health belief model's applicability to culturally distinct populations including Mexican-Americans (Rodriquez-Reimann et al., 2004). Research has attempted to

explain diabetes management in Mexican-Americans using the HBM, however many questions have been raised (Skaiff, Mullan, Fisher & Chesla, 2003).

Research Hypotheses

- 1) It is expected that individuals in the higher acculturation group will have high levels of perceived interference. This is consistent with Talbot et al's (1997) findings that individuals with diabetes longer and with more complications had higher levels of perceived interference of diabetes.
- 2) Similarly, individuals in the higher acculturation group will also have higher scores on the perceived severity scale. This is hypothesized because of previous work showing that Mexican-Nationals have less knowledge about diabetes than Mexican-Americans, therefore those who are more knowledgeable about diabetes will be aware of the complications that are associated with long-term poorly managed diabetes (Bereolos et al., 2004).
- 3) Hispanic individuals have strong family ties, therefore it is hypothesized that those who are less acculturated will have more diabetes-related social support.
- 4) With regard to self-care activities, it is hypothesized that those who are less acculturated will have more positive reinforcing and more misguiding supportive behavior.
- 5) Finally, it is hypothesized that those who are less acculturated will have less self-efficacy. Previous research has found that those with a lower HbA1C have less self-efficacy (Talbot et al, 1997; Glasgow et al, 1989).

CHAPTER II

Methods

Participants

Participants included male and female Mexican-American individuals with type II diabetes from the University of North Texas-Health Science Center family medicine clinics in Fort Worth, Texas. Subjects were recruited as they presented for their medical appointments with their primary care physicians.

Materials

Participants completed the following self-report measures which examined adjustment to diabetes, acculturation, and health beliefs. Participants had the option to complete the questionnaires in Spanish or English.

Biographical questionnaire was designed to gather information related to age, gender, household size, educational status, years living with diabetes, presence of diabetes-related comorbid conditions, frequency of physician visits, frequency of exercising, and the presence of family members with type II diabetes.

Multidimensional Diabetes Questionnaire (MDQ) is a 41-item instrument designed to provide a comprehensive assessment of diabetes-related social and cognitive factors. The items were grouped into three sections: (1) perceptions related to diabetes and related social support; (2) positive and misguided reinforcing behaviors related to self-care activities; and (3) self-efficacy and outcome expectancies. The instrument was composed of seven empirically derived scales that are grouped into three sections. The first section used three scales: (1) perceived interference of diabetes with daily

activities; (2) perceived severity of diabetes and its complication; and (3) perceived social support from family, friends, and health professional in relation to diabetes. The second section measured the frequency of positive reinforcing behaviors and non-supportive behaviors (misguided support behaviors). The third section assessed self-efficacy, which measured a patient's confidence in their ability to perform behaviors specific to diabetes self-care. While the outcome expectancies scale assessed patients' perceptions of the effects of diabetes self-care behavior on metabolic control and on the prevention of complications. Section three rated items on a 0 (not at all important) to 100 (very important) rating scale. While sections one and two used a 7-point Likert scale (0 to 6). Cronbach's alpha ranged from .68 - .89 on this first section.

The second section measured the frequency of positive reinforcing behavior and misguided support behaviors about various self-care activities directed toward the patient by significant others. The items are rated on a 7-point Likert scale. Cronbach's alpha ranged from .70 - .91 on the second section.

The third section assesses self-efficacy expectancies to behaviors specific to diabetes self-care activities and outcome expectancies of the effects of diabetes self-care behaviors on metabolic control and on the prevention of complications. The items were rated on a 1 to 100 scale. Cronbach's alpha ranged from .65 - .86 on the third section.

General Acculturation Index (GAI) was a 5 question measure of acculturation developed by Balcazar, Castro, & Krull (1995) to study cancer risk in Mexican-American women. They obtained a Cronbach's alpha reliability of .82. It was also found that this

measure significantly correlated with education ($p < .001$). This index inquired about language typically written and spoken, geographic location of childhood, ethnicity of friends, and degree of pride in one's Hispanic background. Answers were chosen based on a 5 point Likert scale. To obtain the acculturation index, the answers were summed and divided by 5. As the number increased from one to five, the level of acculturation into the host culture increased.

Glycosylated Hemoglobin (HbA1C) is a blood test that reflected blood glucose levels the preceding two to three months, providing an indication of long-term glucose control (Sacks, Bruns, Goldstein, Maclaren, & McDonald, 2002). The most recent HbA1C was collected from the medical chart. No additional laboratory sampling was obtained at the time that the other questionnaires were completed.

Procedure

Participants included 69 Hispanic-Americans who are currently being treated for diabetes at UNTHSC family medicine clinics. Subjects were recruited as they presented for their medical appointment and asked to complete the questionnaires as they waited for their appointment with their family physician. Participants signed an informed consent form that was approved by the Institutional Review Board and was provided with a packet of self-report questionnaires, which was pre-numbered to insure patient confidentiality. A study staff member who was fluent in Spanish reviewed the informed consent with each potential participant prior to the consent being signed. Medical charts were utilized to obtain the most recent HbA1C value. No additional laboratory analyses were performed at the time that the questionnaires were completed.

Data Analysis

The data was analyzed using SPSS version 11.5. Descriptive statistics and correlations will be run on all of the variables. Standard protocol was used to test the assumptions for MANCOVA to include homogeneity of variance, homoscedasticity, and homogeneity of regression. A MANCOVA was used with acculturation level used as the independent variable (fixed factor) and the seven scales of the MDQ were used as the dependent variable. The dependent variables are continuous while the independent variable is discrete. Several demographic variables were used as covariates including age, gender, and education because of their high correlation with the dependent variables. Post-hoc pairwise comparisons were utilized to identify where unique differences occurred.

Regression was used to calculate odds ratios for any significant dependent variables against HbA1C, whereas HbA1C was dichotomized into low versus high. The high group was used as the reference group.

CHAPTER III

Results

Descriptive analyses were performed on demographic variables to include means, standard deviations, and percentages when appropriate which are provided in Table 1. Ranges for the Acculturation Index (AI) can be found in Table 2. For each of the scales of the Multidimensional Diabetes Questionnaire (MDQ), the means and standard deviations divided by acculturation group can be found in Table 3. The correlation matrix of all variables is presented in Table 4. An alpha level of .05 was used for all statistical tests.

A multiple analysis of covariance (MANCOVA) was performed to test differences on scales of the MDQ based on 3 levels of the AI. Prior to performing the MANCOVA, the Acculturation Index was divided into 3 indices instead of 5 (see Appendix 2). This was done because there were not enough participants per cell. For this measure, the mean was 2.42 and the standard deviation was 1.02. It ranged from 1.0 to 4.5.

Individuals in the low acculturated group tended to speak and read only Spanish, lived in Latin America during childhood, have mostly Hispanics as friends, and felt very proud to be Hispanic. Those in the middle group usually spoke and read Spanish better than English, but not always, usually lived most of their childhood in Latin America, had mostly Hispanic friends, but some Anglo-American ones, and felt proud to be Hispanic. The highest acculturation group usually spoke and read English better than Spanish, has lived in both Latin America and the United States during childhood, have Hispanic and Anglo-American friends, and feel somewhat proud to be Latin.

The homogeneity of variances assumption was met for Severity, $F(2, 42) = .03$, $p = .97$; Social Support, $F(2, 42) = .87$, $p = .43$; Positive reinforcing behavior, $F(2, 43) = .08$, $p = .92$; Misguiding reinforcing support, $F(2, 42) = 2.95$, $p = .06$; Self-efficacy, $F(2, 42) = .47$, $p = .63$; Outcome expectancies, $F(2, 42) = .21$, $p = .82$ based on Levene's Test of Equality of Error Variance. For Interference, there is heterogeneity of variance based on Levene's, $F(2, 42) = 3.2$, $p = .05$. Even though this assumption was not met for this variable, a MANCOVA is robust to this type of violation.

Box's test of equality of covariance matrices was performed and found to be not significant, Box's $M = 98.4$, $p = .1$. This non-significance allows for the rejection of the null hypothesis that the covariances are not homogeneous. In order to test for the assumption of homogeneity of regressions, a model was built to check for significance of interactions of the factors and the covariates. These interactions were not significant, $p > .05$.

The result of the MANCOVA focuses on the independent variable and their interactions with the dependent variables. Because SPSS only computed data on completed data sets, $N = 45$. A total of 24 participants' data were dropped from the final analysis. The overall model was not significant per Wilks' Lambda, $F(14, 66) = 1.76$, $p = .064$. Observed power was .860, which was high. The omnibus F test examines if the model is significant for each dependent variable on the independent variable. The independent variable was acculturation divided into 3 groups; low, middle and high. Misguiding reinforcing behavior was significant, $F(2, 45) = 3.44$, $p = .042$ and Severity was significant, $F(2, 45) = 3.29$, $p = .048$. Covariates included age, years

of education, and gender. Observed power was approximately .75 for these two dependent variables.

Post-hoc pairwise comparisons showed some significant findings. Between the lowest and highest, and middle and highest levels of AI, there was a difference in Severity, $p = .028$ and $.032$. There was a decrease in severity as acculturation went up. The average severity score for the lowest acculturation group was 4.37, the middle group was 4.13, and the highest acculturation group was 2.55. For Misguiding reinforcing behavior, changes were noted between the low and middle group ($p = .015$) and approached significance between the low and high group ($p = .055$). This misguiding behavior was the highest for the acculturation group that was in the middle (3.05), followed by the highest acculturated group at 2.75, and the lowest acculturated group at .90. These comparisons were based on estimated marginal means of the dependent variable.

The final analysis was the odds ratio calculations. First, HbA1C was dichotomized into high versus low by splitting the sample by the mean. Participants that had a HbA1C at or below 7.6 mg/dL were in the low group ($N = 32$) and those above a 7.6 mg/dL were in the high group ($N = 33$). For all odds ratios, the reference group was the high HbA1C group. For Severity, the OR = .765, CI (95%) = .582 – 1.006. The individuals in the low glycemic group were less likely to have high levels of perceived severity of their diabetes and its complications. For Misguiding reinforcing support, the OR = .860, CI (95%) = .650 – 1.137. The individuals in the low glycemic group were less likely to have high levels non-supportive behaviors by family and close friends. For the

acculturation groups, the high acculturation group was used as the reference group.

The lowest acculturation group had the best odds of having better glycemic control, OR = 1.346, CI (95%) = .406 – 4.459, while the middle group still had good odds of have better glycemic control, OR = 1.250, CI (95%) = .348 – 4.486.

CHAPTER IV

Discussion

The health belief model was originally developed approximately 40 years ago when the demographics of the U.S. were very different. It was hypothesized that its developers did not take into account the role of culture, specifically acculturation, in how individuals ultimately make health decisions and undergo behavior change. This project's goal was to identify acculturation's role in the health beliefs of Mexican-Americans with type II diabetes.

It would seem that acculturation affects many components of the health belief model because there are many moderating and mediating factors that come into play when examining beliefs of a Hispanic patient. Aspects of acculturation contribute to the dynamics of each component of the framework, shaping behavioral change. These effects of acculturation on health beliefs are probably not unique to people with diabetes and can be generalized to other chronic diseases. In research related to smoking cessation, Marin et al. (1990) found that family related reasons for smoking cessation were more important for Hispanics than non-Hispanics.

It was noted that three distinct levels of acculturation became representative of this populations (low, middle, and high). This could be indicative of well-established groups of Mexicans that are residing in Tarrant County, Texas. These groups often have their own network of grocery stores, restaurants, places of worship, neighborhoods, and medical professionals therefore, the Mexican-Americans do not have to become acculturated into the Anglo culture in order to survive in the U.S. Quite often there is a

younger member of the family that serves as the interpreter when a Mexican-American needs to obtain services in an environment that does not have individuals who speak English.

Results of this study showed that severity scores from the Multidimensional Diabetes Questionnaire (MDQ) were the highest among those who were the least acculturated and the lowest for those who were the most acculturated. Those individuals who knew of the possible complications of unmanaged diabetes were the least acculturated. Previous research (Bereolos et al., 2004) suggests that those with the highest level of acculturation, those most like non-Hispanic whites should have the highest level of knowledge about diabetes and its complications and score higher on the severity scale. Results that directly examined severity and glycemic control found that those with better control had less perceived severity. Even though this does not take into account acculturation, this group may have had poor glycemic control in the past, have since been educated about their disease, and now believe that with adequate management, diabetes-related complications can be delayed or prevented.

It is difficult to determine what defines severity for this population and there are a number of possible explanations for this. It may be that the least acculturated have many friends or family members in the close knit Hispanic community with diabetes therefore it is more prominent in their lives and they see diabetes' consequences more frequently. It is likely that this group may have less access to health care and experience the more devastating consequences of uncontrolled diabetes. Perhaps, this

group has had poor glycemic control in the past and they have been highly educated about diabetes.

Those who were more acculturated believed that there were less severe consequences to non-adherence to diabetes regimens, worried less about their diabetes, and generally considered diabetes to be a less severe health problem. This is surprising given the attention diabetes has been given in the media and by all healthcare professionals, not just physicians. Comprehensive physician offices often provide patients who have been newly diagnosed with diabetes an opportunity to speak with a certified diabetes educator. These visits allow the patient to learn the components the adequate diabetes management including potential long-term complications. Individuals who are more acculturated have better access to health insurance, thus can visit physician who can provide education services or referrals. Perhaps physicians are too busy treating other co-morbid medical conditions to give adequate attention to diabetes management. Optimal control requires a balance of many variables and physicians may not be attending to each of those variables or not referring to appropriately trained individuals such as nutritionists, health psychologists, social workers, or certified diabetes educators. Because the individuals with diabetes are lacking adequate treatment of their disease, they are not completely aware of the severity of their illness and its possible complications.

Misguiding social support is a form of non-supportive, nagging type behavior provided by family members, usually a spouse or significant other. The MDQ identified these items by using the word "hassles me" in the statement. Therefore, these

questions were asking about how much a spouse nags about diabetes-specific management behaviors such as diet, exercise and medication adherence. Individuals with the lowest level of acculturation scored the lowest, while those in the middle group of acculturation scored the highest. Therefore, those with the lowest level of acculturation had the least amount of non-supportive behavior. This indicates that the close-knit families that adhere to their Hispanic roots are somewhat protected against misguided social support. This could be indicative of these Hispanic families holding onto traditional family roles. Quite often when a family member reminds to the one with the diabetes to properly adhere to treatment recommendations, the individual with diabetes does not perceive this as nagging behavior because it is customary for family members to give advice.

This is significantly different than the individuals in the middle and high acculturation group. These individuals may be acting more individualistic in nature where each family member is watching out for themselves, so the spouse is not being sensitive to the psychological needs of the individual with diabetes.

Acculturation was a moderating factor between perceived severity and misguided support. In specifically examining the relationship between acculturation and hemoglobin A1C (HbA1C), the group of individuals with the lowest level of acculturation had the best odds of being in the low HbA1C group, followed by the middle acculturation group (the high acculturation group was the reference group). Acculturation also has a direct effect on glycemic control, which has implications for healthcare personnel. Perhaps becoming involved in mainstream Anglo-centered

medicine may not be absolutely beneficially for these individuals with diabetes as other culturally sensitive mechanisms are proving to be more beneficial when it comes to glycemic control.

Practitioners wanting to improve glycemic outcomes should target perceived severity and misguided supportive behaviors because these were the variables found to have the most utility for this particular group of Mexican-Americans. Professionals need to be aware of the importance of these variables. Using a multi-disciplinary approach may best be utilized for treating these patients so that comprehensive diabetes management can be achieved. Including families may be a particularly effective way to target misguided supportive behavior as it is the family members who are contributing to the daily hassles and nagging. This population would be eager to include family in any stage of treatment planning as it is culturally appropriate to do so.

Limitations of This Study

Numerous limitations were noted in this study. First, there is a very limited sample size ($N = 69$). Second, the study participants were recruited from a family medicine clinic in North Texas, therefore this type of individual may not be representative of a majority of Mexican-Americans living in the United States. Also, patients who attend these clinics usually have insurance and based on a review of Mexican immigrants, most (53%) do not have health insurance. Even approximately 33% of U.S.-born children of Mexican immigrants lack coverage. Those children that did have it were usually covered by Medicaid (Camarota, 2001). Because this sample may

not be representative of most Mexican immigrants who are currently residing in the U.S., the current results are restricted in the generalizability of the conclusions.

The MDQ may not have adequately measured constructs of the HBM. Some of the scales may not have included enough questions to appropriately measure the construct. This could limit the applicability of the scale. Therefore the results may not sufficiently represent the true health beliefs of this population.

The measure of acculturation that was used included only 5 questions, which may not provide an adequate measure of acculturation. There are more extensive measures of acculturation including the ARMSA-II that provide more global measures of acculturation (Cueller, Arnold, & Maldonado, 1995). This measure was not used, however, due to the length of the measure and it was assumed that the participants would not consent to participate if it would require a lot of time.

Because the sample was small and the acculturation index included so few questions, only three distinct groups of acculturation emerged from this data. This limited the type of generalization that could be extracted and perhaps limited the number of significant findings. The range of data for the acculturation index was very limited, as this population did not have a large amount of individuals who scored on the very high end or very acculturated end of the scale.

HbA1C levels were the most recent values in the medical chart. Laboratory tests were not gathered at the time that the questionnaires were completed, therefore may not be indicative of glycemic control at the time of study consent. However HbA1C values do provide average glycemic control during the preceding 2-3 months.

Another limitation was the correlational design of the study. It did not involve the manipulation of the variables, therefore no causality could be determined. The sample size was also a factor in this.

Implications of the Current Research

There is a strive for culturally competent care with respect to immigrant health. Beliefs and values in the biomedical model highlight barriers in caring for immigrants including the concepts that traditional beliefs should be changed, people should be willing to follow directions provided by health care professionals, adherence failure is caused by the patients, patients have autonomy except with regard to adherence, and that healthcare is accessible to all (Tripp-Reimer, Choi, Kelley, & Enslein, 2001). There is a belief that practitioners need to develop skills to provide culturally competent diabetes care to immigrants. Those skills include adapting communication patterns, performing culturally sensitive assessments, modifying diabetes education programs, and strategizing in solving noncompliance issues.

Patients [Mexican-Americans] also want an atmosphere where health care providers foster trust, acceptance, and respect. Great importance is put on interpersonal behavior and helping one another. These individuals prefer interactions with providers to be easygoing and casual which has been termed, *simpatia*. This makes the interaction less serious, regardless of the topic. This communication style when combined with spirituality, family, and the use of non-prescribed medications leads to health care barriers while in the U.S. because Western health care providers do not adhere to this style (Warda, 2000).

Extensive research has been done with the health belief model and a lot of its results have been significant in that it has been used as a predictor model to explain health behaviors. Results have varied, however, depending on the disease and population being studied. Parts of the model are significant under certain circumstances. This project sought to understand the significance of the model with Hispanics who have diabetes. It was concluded that this model did not fully explain the beliefs of this population and it is believed that a more comprehensive model that incorporates culturally relevant factors may be necessary to explain health behaviors of Hispanics with diabetes. It is worthwhile to note that Steers et al. (1996) investigated the predictability of the health belief model among different ethnic groups and their results found that it predicted safe-sex behaviors for Euro-Americans better than for Hispanics, African Americans, or Asian Americans. Therefore, it is known that the HBM has validity for certain circumstances, just additional work is warranted with regard to ethnic groups. Finally, further research is needed to determine how cultural factors influence the decisions Hispanics make in deciding whether or not to be compliant with diabetes self-management regimens (Caban & Walker, 2006). Genetics, education, socioeconomic health disparities, lifestyle, environment, and culture all affect diabetes self-management and control in Mexican-Americans (Egede & Dagogo-Jack, 2005).

INDIVIDUAL PERCEPTIONS

MODIFYING FACTORS

LIKELIHOOD OF ACTION

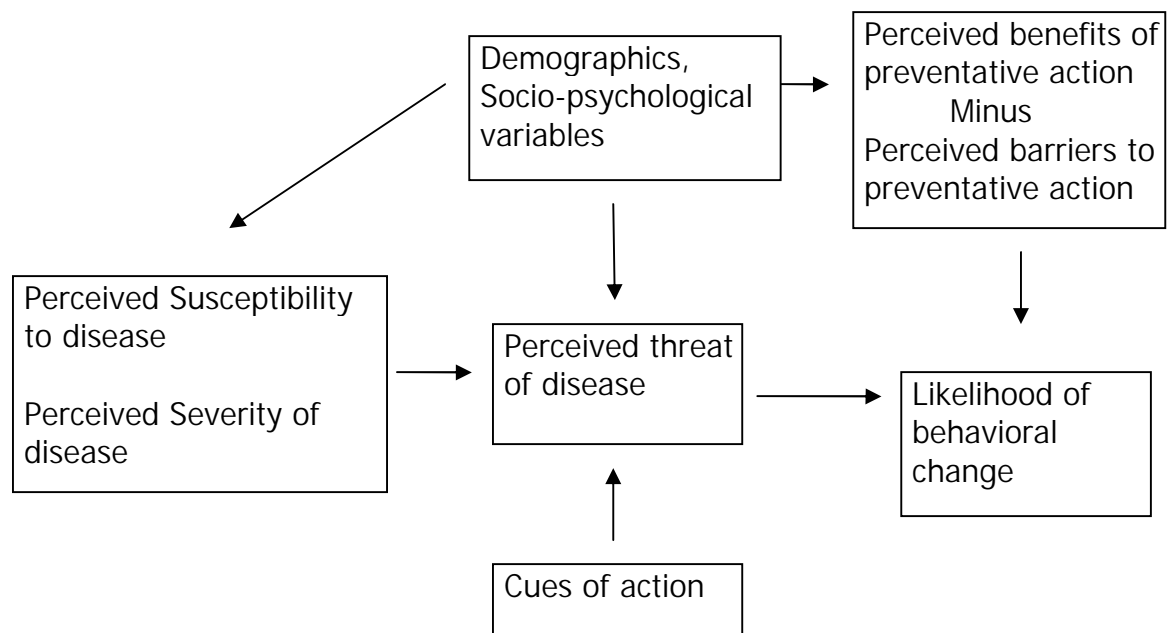


Figure 1. The Health Belief Model as it was originally developed by Becker (1974).

INDIVIDUAL PERCEPTIONS MODIFYING FACTORS LIKELIHOOD OF ACTION
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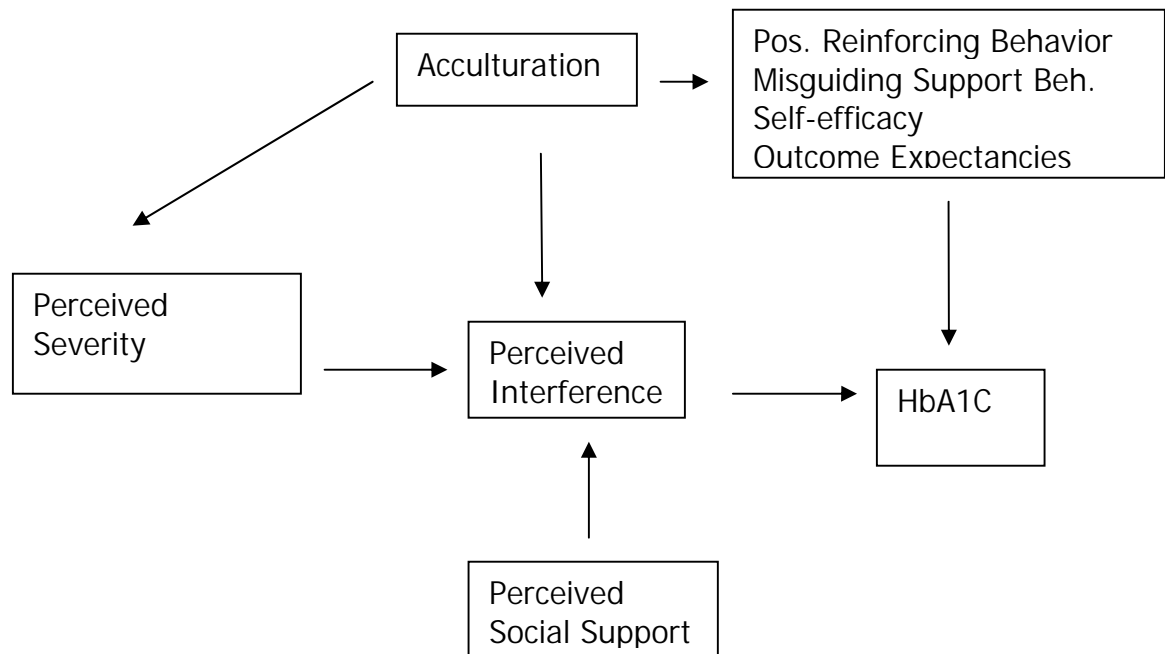


Figure 2. The health belief model as indicated by HbA1C, acculturation, variables of the MDQ.

Table 1

Demographic Variable Summary (N = 69)

Variables	Mean	Standard Deviation	Median	Range
Age	60.35	12.48	62.00	19.0 – 87.0
Years of Education	6.35	4.46	5.00	0.0 – 15.0
Years of Diabetes	12.67	9.32	11.00	0.3 – 35.0
HbA1C	7.99	1.72	7.70	5.1 – 13.1

Variables	N	Percentage
Gender		
Male	28	41%
Female	40	58%
Language completed questionnaire in		
Spanish	37	54%
English	32	46%
How often see physician for diabetes		
Monthly	16	24%
Every three months	42	63%
Twice a year	9	13%

Table 2

Characteristics of New Acculturation Groups

Level of Acculturation	Range	Count
<hr/>		
1 (low)	1.0 – 1.8	27
2 (middle)	2.0 – 3.0	21
3 (high)	3.2 – 4.5	20

Table 3

Dependent and Independent Variable Summary

Variables	Mean	Standard Deviation
MDQ-Interference		
Acculturation – Low	2.65	1.66
Acculturation – Middle	3.01	2.11
Acculturation – High	1.61	1.84
MDQ-Severity		
Acculturation – Low	4.09	1.61
Acculturation – Middle	4.36	1.95
Acculturation - High	2.76	2.13
MDQ-Social Support		
Acculturation – Low	5.08	.96
Acculturation – Middle	5.56	.77
Acculturation - High	5.14	1.16
MDQ-Positive Reinforcing Behavior		
Acculturation – Low	4.43	1.75
Acculturation – Middle	4.40	1.43
Acculturation - High	4.08	1.68

(table continues)

Table 3 (continued).

Variables	Mean	Standard Deviation
MDQ-Misguiding Reinforcing Behavior		
Acculturation – Low	1.17	1.75
Acculturation – Middle	2.79	2.43
Acculturation - High	2.72	2.19
MDQ-Self-efficacy		
Acculturation – Low	74.14	19.76
Acculturation – Middle	66.33	16.35
Acculturation - High	79.61	12.06
MDQ-Outcome Expectancies		
Acculturation – Low	95.19	7.98
Acculturation – Middle	96.09	5.82
Acculturation - High	94.08	7.94

Table 4

Intercorrelations Among Variables

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13
1. HbA1c	-												
2. Age	-.10	-											
3. Language	-.02*	-.20*	-										
4. Gender	-.17	-.04	.23*	-									
5. Years of Education	-.17	-.42**	.55**	.27*	-								
6. Acculturation Level	-.01	-.14	.72**	.15	.51**	-							
7. Interference	.35**	-.03	-.23*	-.26*	-.19	-.15	-						
8. Severity	.26*	-.36**	-.28*	-.06	-.04	-.21*	.70**	-					
9. Social Support	.16	-.16	-.09	-.04	-.02	-.17	.13	.30**	-				
10. Positive Reinforcing Behavior	.26*	-.16	-.16	-.31*	-.15	-.14	.15	.20	.63**	-			
11. Misguiding Reinforcing Behavior	.18	-.07	.31*	-.26*	.14	.29*	.34*	.18	.22	.32*	-		
12. Self-Efficacy	-.18	.14	-.09	.03	-.00	-.10	-.19	-.13	.15	.23	-.15	-	
13. Outcome Expectancies	-.15	-.11	-.12	.15	.07	-.14	.08	.27*	.23*	.08	.04	.31**	-

Note. * $p < .05$. ** $p < .01$.

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